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# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •

NOVEMBER 12, 1932

## Showerbath of Sparks

See Page 315

A SCIENCE SERVICE PUBLICATION

# SCIENCE NEWS LETTER

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The Weekly Summary of Current Science

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*Edited by* WATSON DAVIS

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## ? DO YOU KNOW THAT ?

Roots of the mandrake plant are said to be the oldest hypnotic known to man.

Soviet Russia is experimenting with making shoe soles of viscose.

The stomach capacity of a horse is only one-tenth that of a cow.

Charles Darwin observed that, with a few exceptions, the singers among birds are small species.

Day-blooming water lilies may be kept from "going to sleep" at night by a new method using paraffin.

A copper model of a two-wheeled cart unearthed in India is said to be older than the oldest wheels from Ur and Egypt.

Automobile graveyards on vacant lots may soon be things of the past, it is predicted, since the hulks can be converted into new steel by use of a new form of briquetted ferro-alloys.

The Soviet Union, which has the largest Arctic frontier of any country, has twenty polar expeditions of various kinds organized this year.

Iron spear heads have occasionally been found embedded in the tusks of elephants.

British invention has provided a machine roller to aid paperhangers in placing wallpaper quickly and smoothly.

Less than a hundred years ago, the only way of providing milk on ocean voyages was by carrying a cow on the ship.

The famous Pontine Marshes of Italy, where malaria mosquitoes flourished, are being drained and turned into rural settlements.

A prehistoric flint mine at Ivinghoe, in England, has yielded among other relics a fine flint ax with a huge left-handed grip.

Astronomers are not yet certain whether the giant planets Jupiter, Saturn, Uranus and Neptune, have any solid surfaces.

"Gloves," consisting of a special cream rubbed on the hands, are a new idea for mechanics and painters, to prevent dirt from getting into the pores.

## WITH THE SCIENCES THIS WEEK

**Curiosity arousing questions for the teacher and general reader. Book references in italic type are not sources of information of the article, but are references for further reading. Books cited can be supplied by Librarian, Science Service, at publisher's price, prepaid in U. S.**

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In how many papers published during the past three years has Sir Arthur Eddington set forth his contentions about the electron? p. 303. *The Nature of the Physical World—A. S. Eddington—Macmillan*, 1929, $3.75.

PHYSIOLOGY

How many new blood types have been found by a Danish scientist? p. 309.

PLANT PATHOLOGY

Why has elimination of *commelina nudiflora* become important to celery growers? p. 308.

PHYSICS

# Eddington Reveals Details of His Theory of the Electron

## If New Paper Stands Test of Scientists It Will Remove Chief Obstacle to Progress of Physics, American Thinks

By Dr. R. M. LANGER, California Institute of Technology

SIR ARTHUR EDDINGTON, the British scientist, has finally laid his mathematical cards on the table and offered in the *Proceedings of the Royal Society of London* what he claims is a rigorous proof of his contentions about the electron. He has, during the past three years, published seven other papers on this subject, none being complete. Each time he left some unsatisfactory gaps in his proofs but asserted, nevertheless, that he was sure all would be well and that the next paper would be conclusive.

The scientific world was decidedly incredulous. The theory did not appear plausible. It was difficult enough so that physicists who were capable of handling the material considered it would not pay to take the subject too seriously until Eddington himself had worked it through. They agreed it was a clever idea, but felt that a scientist ought to have more than a hunch before offering to publish a result.

Now Eddington is a brilliant man. He has made mistakes, it is true, but when he publishes an eighth paper, one can scarcely disregard it. Such persistence must be well supported. Moreover, this paper is attractively arranged. It begins by pointing out some of the errors of the previous papers. The premises are acceptable. The results claimed are of most extraordinary significance. Finally it does carry weight when a man like Eddington definitely says his calculations are rigorous.

Physicists, with the help of mathematicians, will now undertake to check the argument and in a few months we shall know whether there are any serious flaws in it. The difficulty in reading the article lies in the fact that two separate fields are involved, viz., quantum mechanics and relativity. There are not many sufficiently experienced in both of these to be able to read the proofs without hard work. The presentation is extremely concise and the reader will have to fill in many large gaps—certainly no statements can be accepted without verification. Prestige counts for little in these matters.

No matter how critical the previous atittude was, the proofs, if correct, will be readily accepted. Eddington will then have obtained undoubtedly the greatest results of both the quantum theory and of the relativity theory. The theory of the electric charge will have been improved to a degree of perfection unmatched in natural science. The chief obstacle in the path of progress of the last three years will have been removed and physics (*Turn to page* 315)

MEDICINE

## May Get Tularemia From Mosquito Bite

MOSQUITOES, which play an important role in the transmission of malaria and yellow fever, may also carry tularemia or rabbit fever, Cornelius B. Philip, Gordon E. Davis and R. R. Parker of the U. S. Public Health Service have found in studies made at the Rocky Mountain spotted fever laboratory at Hamilton, Mont.

The part played by the mosquito in carrying tularemia is purely mechanical. If a mosquito is interrupted while feeding on an infected animal, and bites soon after, he can pass the infection along to his next victim. The disease may also be acquired when infected mosquitoes are crushed on the skin, with or without subsequent rubbing, and when mosquito excrement is deposited on the skin.

The investigations here were undertaken after a few cases had been reported in each of which a mosquito bite was thought to have given the infection. While this is possible, the scientists believe it would be a very rare occurrence.

"It is probable that at most only infrequent infection of man would occur in this manner," they concluded.

*Science News Letter, November 12, 1932*

ARCHAEOLOGY

## Eskimo Burial Mystery Cleared Up at Point Barrow

THE MYSTERY of whether Eskimos of Point Barrow had an old custom of burying their dead in houses of the villages, or whether they built house-like sepulchres for them, has been cleared up by the excavation of ancient graves.

The solution of the mystery is that Eskimo dead were not buried in house-like tombs at all, is the report brought back by James A. Ford, who has spent more than a year continuously in the Alaskan Arctic, on an expedition for the U. S. National Museum.

Digging into small natural knolls in prehistoric Eskimo graveyards at Nunavaak and at Utkiavik, on Point Barrow, Mr. Ford found burials of some very old, prehistoric Eskimos. Their earthen tombs were made by slashing off the top

SKULL OF A BOW-HEAD WHALE

of a knoll, laying a platform of planks on the flattened eminence, and then placing the dead, wrapped in caribou or musk ox skins, on the platform. An earthen covering was replaced on the mound.

The rounded mounds with the plank flooring inside resembled remains of Eskimo houses sufficiently to lead early explorers to believe that houses were built for the dead in ancient times in the Arctic.

The two graveyards excavated by Mr. Ford were of the period of Eskimo culture known to archaeologists as "Old Bering Sea." The villages to which the graves belonged have disappeared. It appears that they were close to the seashore, and that they have sunk beneath the sea.

### Traced Evolution of Culture

Mr. Ford's expedition attained its goal of tracing the evolution of Eskimo culture in this northern tip of Alaska, far north of the Arctic Circle.

"Excavation of five sites around Point Barrow verified the sequence of Eskimo cultural history as it has been worked out in other parts of Alaska," Mr. Ford stated. "The graves yielded evidence of the oldest period, the Old Bering Sea culture, with some objects of a later development which we call the Birnirk stage.

"At the villages the sequence was carried up into later times. The older villages contained objects made by Eskimos of the Birnirk stage and in the later, upper levels of the remains there were evidences of the Thule type of culture well established. In another village which had a history extending into modern times, the early settlers had lived in days of Thule culture."

### Only Bow-Head in Nation

Besides archaeological specimens of the old Eskimo culture history, Mr. Ford brought back to Washington the great skull of a bow-head whale, one of the largest of these sea-dwelling mammals. The skull is pronounced the only bow-headed skull ever brought into the United States. It will be exhibited at the U. S. National Museum.

The whale was killed in the fall whaling of Eskimos at Barrow. Mr. Ford, who was one of the crew in the Eskimo boat, assisted in the kill and received as his share a portion of the meat, and the skull, which the Eskimos thought quite worthless.

*Science News Letter, November 12, 1932*

MEDICINE-PHYSICS

# Electrified Particles in Air May Explain "Curative Values"

## German Worker Reduces Blood Pressure With Negative Ions; American Finds Fewest Ions in Occupied Room

WHEN DOCTORS write Rx for curative atmospheres or engineers design air conditioning apparatus to turn outdoors' frigid winter or torrid summer into an exhilarating spring day atmosphere indoors, they may need to specify one factor at present ignored: the electrical conductivity or ionization of the air.

Everywhere about us there are minute charged particles that act as bridges for electrical currents to cross. These ions, as they are called, start out in life as atoms or molecules from which an electron has been knocked. The removed electron becomes a negative ion and the rest of the atom or molecule has a positive electrical charge. Next in the life cycle of an ion is the coming together of some ten positive ions or electron-lacking molecules to form a positive aggregation called a "light ion" to distinguish it from a "heavy ion" which is sometimes formed by the attachment of either a positive or negative ion to a dust or water particle in the air.

From hour to hour and place to place the ions of the air vary. They increase under the influence of X-rays, radium, ultraviolet light, high voltage discharges, flames, red hot substances and even the breaking of waves on a sea beach. The radioactive matter in the soil is probably the largest factor in the ionization of the air.

In the current issue of the *Journal of the Franklin Institute*, Dr. Lewis R. Koller of the General Electric Company's Research Laboratory calls attention to the possible health importance of air ionization.

Ionization may take its place alongside pressure, temperature, radiation and humidity as an important physical factor present in the atmosphere.

Hints have accumulated in past years that atmospheric electricity may have beneficial and harmful biological effects on human health. Mountain or sea level climates seem to help some ills, radioactive springs have their advocates, and rheumatism and the gout are influenced by the weather. It is possible that the ion content of the air may be the answer.

This theory is being tested in this country and in Europe. Prof. Friedrich Dessauer at the University of Frankfurt, Germany, constructed an ion-producing apparatus and subjected both normal and ill persons to high concentrations of both positive and negative ions.

His most striking therapeutic effects were obtained with patients suffering from high blood pressure, rheumatism, gout, neuritis, neuralgia, bronchitis, asthma and heart and arterial diseases. Inhalation of negative ions at frequent intervals over a period of weeks produced blood pressure decreases which persisted for a longer time and improvement in condition. Positive ions produced headaches and discomfort in healthy individuals.

At the Harvard School of Public Health, Prof. C. P. Yaglou found that occupied rooms have fewer ions than outdoors or rooms that are unoccupied. (*SNL, Feb. 6, '32, p. 84*)

Dr. Koller has developed methods of producing and measuring ions. If the ion content of the air is found to have a real effect on health, the next step will be to add an ion regulator to the heating, refrigerating, and humidifying equipments that promise to air-condition the buildings of the future.

*Science News Letter, November 12, 1932*

ASTRONOMY

# Compression of Hydrogen May Cut Guess at Sun's Age

IF THE SUN is a chemical factory in which the light element hydrogen is being turned into other and heavier elements by tight packing together of atoms, then its lifetime may be only a hundredth of the age now estimated by most astronomers.

This new and shorter estimate of the possible age of the sun is put forth in

the annual report of the Smithsonian Institution by Theodore Dunham, Jr., of the Mt. Wilson Observatory.

The current estimate of the sun's age is on the order of a million times a million years. It is based on the assumption that the sun shines because matter is being burst asunder into pure energy. The opposite assumption, of matter in a light form being turned into matter in a denser form, would still call for some conversion of matter into energy, but not nearly so much. Hence the possible reduction of the sun's age by 99 per cent.

*Science News Letter, November 12, 1932*

BACTERIOLOGY

## Radium Found Deadly To Germs of Disease

RADIUM has a devastating effect on disease-causing bacteria, Dr. Otto Mayer of Berlin has discovered. He prepared broth cultures of streptococci, which cause blood poisoning, of staphylococci, or pus-forming bacteria, and of colon bacilli. In each flask he immersed a small amount of highly radioactive material, encased in rubber. Similar flasks were left without the radiation, as controls. The control flasks produced teeming growths of bacteria, while the irradiated cultures after a few days were completely sterile. Dr. Mayer suggests radium treatments, such as are now used for cancer, for deep-seated massive bacterial infections.

*Science News Letter, November 12, 1932*

ENGINEERING

# Largest Diesel Engine Built For Danish Power Plant

### Engineers Will Watch Its Performance, Seeking Knowledge Of Coming Events in Possible Industrial Revolution

THE WORLD'S largest diesel engine has been built for the Copenhagen power station to drive a 15,000 kilowatt generator.

Considering that it is an internal combustion engine, it is a massive machine, having an overall length of almost 65 feet and a height of about 35 feet. Its eight cylinders are comparable in size with an automobile, each being nearly a yard in diameter with a piston travel of almost five feet.

This crude-oil burning engine is rated at 22,500 brake-horsepower and will be used as an auxiliary to help a steam power plant carry its peak load. Its builders claim that a large diesel-powered generator can be built more cheaply than a corresponding turbine and boiler plant and have put forward plans for the construction of a 30,000 kilowatt generator to be run by a 40,000 brake-horsepower diesel.

Crude oil is injected into Copenhagen's new engine at pressures as great as 6,000 pounds per square inch. Its speed is 115 revolutions per minute. The proposed larger engine would turn 187 times a minute.

The installation of the 22,500 horsepower engine is being watched by engineers everywhere because it is the latest and one of the most important events in a possible industrial revolution. Its successful and economical operation will mean the wider use of crude oil as automobile and airplane fuel and as the source of energy for electricity.

Rudolph Diesel's invention has many advantages to recommend it. Contrasted with the conventional automobile and airplane power plant, it lacks an ignition system and uses cheap, practically non-inflammable oil instead of gasoline.

In Europe, where gasoline is costly, the diesel engine is already used as the power plant for many trucks and busses, but in America, with gasoline cheaper, its application to the automotive field has not been so rapid.

America is also witnessing the development of the diesel airplane engine which has been largely fostered by the Packard Company. The weight per horsepower has been reduced to a figure comparable with that for gasoline and the advantage of non-inflammability of fuel was unfortunately illustrated by a fatal accident. Capt. L. M. Woolson, the Packard engine's designer, was killed in a crash during a fog in his diesel-powered plane, but the ship did not burn.

The diesel was initially a heavy engine, and its widest application is as a marine and stationary power plant. But research has consistently reduced its weight. Because of the diesel's small size and lightness compared with steam boilers and turbines, the new German "pocket battleships" are propelled by such engines, which were specially built much lighter than most marine diesels. Europe has a number of larger diesels in stationary power plants, one of which is a 15,000 brake-horsepower engine in the Hamburg power station. Seven thousand horsepower is America's largest, installed at Vernon, Calif.

*Science News Letter, November 12, 1932*

**TOO BIG FOR AN AUTOMOBILE**

***This internal combustion engine, the world's largest Diesel, is shown nearing completion on the construction floor.***

HISTORY

# New Chapters in American History

## Studies Indicate that the Kensington Stone of Minnesota Is a Record Left by Goths and Norsemen in 1362

By EMILY DAVIS

SCHOOL CHILDREN may soon find that they have a brand new chapter of American history to learn. It will be a chapter of fourteenth century history, sandwiched in between the story of Leif Ericsson sailing to Vinland in 1000 A.D., and Columbus' celebrated voyage across the Ocean Sea in 1492. Into that fourteenth century, now a blank sheet in America's past, is being written a tale of exploration in America so unbelievable that scientists have scarcely dared to think it could be proved true.

It is a story of a band of Goths and Norsemen who sailed to America and pushed their way deep into the wilderness, as far as Minnesota. There, ten of the party were attacked by Indians. The others, returning from fishing, found the camp raided and their comrades lying "red with blood and dead." Fearing for their own lives, the survivors moved on, and when they found a shelter they stopped and set up a rune stone to commemorate the disaster. And then these survivors themselves disappeared from the historic record.

The rune stone telling about this fourteenth century murder mystery was unearthed at Kensington, Minnesota, 35 years ago. Then began a long siege of argument. Was the Kensington rune stone a hoax made by some modern Scandinavian settler? Or if the stone was authentic, what did it really mean to American history?

One man in particular, a student of Minnesota history named Hjalmar R. Holand, has had faith in the Kensington stone. For 20 years he has bent every effort to get to the bottom of the mystery the stone represented. One by one, he reports, the obscure points have become clear. After all this time, he has published the result of his research, presenting a book full of evidence so that Americanists can weigh the case.

As for himself, Mr. Holand writes, "Only one conclusion seems possible; That the Kensington rune stone is a genuine record left by Norse explorers in Minnesota about 1362."

And he adds, still more impressively: "This runic inscription is perhaps the most important that has ever come to the attention of man. It is the only legible runic inscription found in America.

"Finally, it has a priceless significance in that it is the oldest native document of American history written by white men."

The stone which Mr. Holand gives so important a place in American history is a slab of dark colored rock 31 inches long, with an inscription in runic alphabet characters on one flat side and along one edge.

The stone came to light in 1898 when a farmer happened to clear a rough piece of timber land. The farmer, Olof Ohman, was grubbing stumps when he attacked a particularly troublesome tree. Swing as hard as he could, his axe made little headway. And the reason, he discovered, was that a flat stone was fixed under two of the biggest roots.

Mr. Ohman got the exasperating stone out and forgot it. But his little son dusted off the slab and pointed out curious marks cut into it. The neighbors came to see and the rumors spread. The stone gained such fame that it was displayed in the Kensington bank window. Thousands came to look at it.

### Became a Doorstep

Then, a professor of Scandinavian languages was consulted. He read off part of the writing, and, thinking in terms of eleventh century Viking expeditions, he pointed out that something was wrong. Such writing was not the correct form used at the time of the Viking voyages. European scholars were consulted, too. They promptly called the stone a clumsy fraud, perpetrated by some immigrant.

So the Kensington stone came back to its discoverer, and in disgust at the whole business Mr. Ohman threw it down for a doorstep in front of his granary. There it lay, face down, for nine years.

Then, Hjalmar Holand came that way seeking data for a history of Norwegian immigration, and he heard so many stories about the Kensington rune stone that he asked Mr. Ohman to give him the granary doorstep.

**BEFORE COLUMBUS**

***More than 350 years after Leif Ericsson and over 100 years before Columbus a band of men sent out by the King of Norway and Sweeden covered this route, new studies of the Kensington stone and Scandinavian literature indicate.***

When Holand had lugged the prize home and studied it, he discovered something that put an entirely new light on the situation. He found on the edge of the stone the date 1362. No wonder the runic alphabet characters were not in proper eleventh century style, thought Mr. Holand to himself. But—would they prove authentic fourteenth century letters? He decided that the stone was worth a complete investigation.

Mr. Holand's translation, which is regularly accepted, is as follows:

"(We are) 8 Goths (Swedes) and 22 Norwegians on (an) exploration-journey from Vinland over the West (i.e., through the western regions) We had camp by 2 skerries (i.e., by a lake wherein are two place-rocks) one days-journey from this stone We were (out) and fished one day After we came home (we) found 10 (of our) men red with blood and dead Ave Maria Save (us) from evil"

On the edge of the stone, Mr. Holand read these words:

"(We) have 10 of our party by the

sea to look after our ships (or ship) 14 days-journey from this island Year 1362"

Eagerly, Mr. Holand searched Scandinavian literature for a Norse adventure to fit this story. He found one.

"A Norse expedition was actually sent to American waters by the King of Norway and Sweden in 1355," he writes. "This expedition appears to have returned in 1364."

And Mr. Holand adds that if the inscription is genuine it must refer to this expedition.

### Missionary Expedition

To many critics, one of the stumbling blocks in accepting the Kensington rune stone as authentic has been the mixed personnel of the group described in the inscription. Goths and Norsemen in one party would be an absurdity, critics declared. Only a stupid person planning a hoax would fall into such a blunder.

But an "absurd" crew of Goths and Norwegians sailed together on that unique expedition of 1355, Mr. Holand found. The political situation in Scandinavia brought this about.

A king named Magnus ruled Norway and Sweden jointly at that time. He learned that the Christian colony of Norsemen in Western Greenland had abandoned their faith. In horror and distress, the king planned a missionary expedition to set out to re-convert the colony. Selecting Paul Knutson as leader, the king ordered him to take men from the royal retinue and from retinues of other men and to set out.

Now, King Magnus was noted for favoring his home province of West Gothland in Sweden, and his own retinue would naturally have furnished Goths. Knutson, a Norwegian, would just as naturally have picked Norsemen for the rest of his crew.

The language on the Kensington stone, a mixture of Swedish, Norwegian, English, and a Latin phrase, is about what would be expected of such a group, Mr. Holand argues. Soldiers and sailors, perhaps a priest or two, some Swedes, some Norwegians, would come to talk an idiom of their own.

But to return to the expedition's career. It seems queer that a religious crusade to Greenland should be massacred in Minnesota.

Not so hard to believe, says Mr. Holand.

The Greenland colonists who abandoned their faith also abandoned Greenland. Where they went has never been known. Ahead of them lay that famous land of Vinland where timber and grapes grew in profusion.

Not finding the colony in Greenland, Knutson trailed them—somewhere—for about nine years. Mr. Holand theorizes that the trail led Knutson to Vinland, somewhere on the northeast coast of America. Then the expedition trailed north around the coast into Hudson Bay to the Nelson River.

There the expedition left its ships "by the sea" and ventured into the wilderness in canoes and on foot. And 1,000 miles from the ships came the massacre. Perhaps redskins had been tracking the strangers for days, waiting the chances when the camp was divided, some men fishing, some resting at the camp. The attack was ferocious and the Indians went off with scalps.

Among the "discrepancies" pointed out in the Kensington stone inscription, one big one was the statement about the camp being 14 days-journey from the ships. It was pointed out that in no direction could 14 days travel bring medieval explorers to the sea.

As usual, Mr. Holand found an answer. A days-journey was a phrase used by Scandinavian sailors in the Middle Ages as a definite unit of distance, equal to about 75 miles. This was a standard distance for a day's sailing. The distance from Iceland to Greenland was "four days-journey" to a Norseman, though it usually took several weeks to weather the ice and fog between the two lands. The Kensington stone lay just about 14 days-journey from Hudson Bay, in sailors' terms.

### Negative Possibility Tested

The rune-master who carved the stone used this term twice. He said that the tragedy occurred a days-journey away from the place where the stone was being set up. This camp was by a lake with two skerries, that is, boulders of place-rock projecting out of the water. Mr. Holand sought such a site a real day's walk from Kensington and could not find it. Now, he searched 75 miles north of Kensington, and among hundreds of lakes there he found just one that fitted the description.

From only one high point is it possible to see the two skerries at once, and from this Mr. Holand judges that the high point was the camp-site where the Indian massacre took place.

The champion of the Kensington stone has not been content with piling up evidence that the stone is an authentic record of history. He has also tested the negative possibility, that the stone was faked.

Holand checked up on the growth of aspen trees in that part of Minnesota. The age of the aspen that held the Kensington stone was fixed at not less than 70 years. This date would apparently rule out the possibility that a modern settler faked the inscription. The first pioneers came to settle Minnesota about 1850.

As if to bear out the truth of the fantastic tale of medieval adventure in America, no less than four old axes have been unearthed in western Minnesota. Like everything else associated with the Kensington stone story, these axes have been branded "impossible."

Mr. Holand toured museums in six European countries several years ago, and came home convinced that the Minnesota axes are authentic weapons lost by Knutson's crew. All are of types used during the same medieval period and all are Scandinavian.

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*Science News Letter, November 12, 1932*

**KENSINGTON STONE**

***"Oldest native document of American history written by white man."***

PHYSICS

## Altitude Increases Quantity of Cosmic Rays

FIVE MILES up in the air cosmic rays are many times as plentiful as they are on the surface of the earth, but they are also much less powerful and less effective than those at ground level.

Thus may be summarized research into the character of the puzzling cosmic radiation conducted by Dr. L. M. Mott-Smith of Rice Institute, Houston, Texas, and the U. S. Air Corps at Wright Field, Dayton, Ohio. Data were collected by Capt. A. W. Stevens, prominent because of his achievements in long range photography, Capt. R. C. Moffat, Lieutenants J. F. Phillips and C. D. McAllister. They used an electroscope designed especially for airplane observations by Dr. Mott-Smith and Dr. L. G. Howell, also of Rice Institute.

"We find that the intensity of cosmic rays at 25,000 feet is about 21 times that at sea level and is still increasing rapidly," Dr. Mott-Smith told Science Service. "Another interesting thing is that at 25,000 feet as small an amount as one inch of lead reduces the intensity by forty per cent, a surprisingly large amount."

An inch thickness of lead is an ineffective barrier in the path of cosmic rays on the surface of the earth. Though this much lead will stop practically all X-rays and other forms of radiation, a quantity sufficient to block cosmic rays must be measured in feet.

In this study measurements of cosmic rays were made at elevations of 5,000, 10,000, 15,000, 20,000 and 25,000 feet, each measurement consisting of an average of ten individual readings.

*Science News Letter, November 12, 1932*

CHEMISTRY

## Tungsten Electroplating Process Patented

THREE PATENTS for electroplating tungsten from solutions of the metal salt dissolved in water have just been issued by the U. S. Patent Office to Prof. Colin G. Fink of Columbia University.

The tungsten deposit is smooth, hard and coherent, and has a high luster. No polishing after the plating operation is necessary if the article to be plated is first polished.

The tungsten plating has unusual properties. It is not attacked by acids or aqueous alkaline solutions and does not tarnish in the air. It is, therefore, an ideal metal for protecting other metals from corrosion, especially in chemical apparatus.

Many unsuccessful attempts have been made during the last sixty years to develop a commercial method for electroplating with tungsten. Prof. Fink has the distinction of being the first chemist to succeed in plating out tungsten from solutions of tungsten salts in water by a process which can be carried out on a commercial scale. He accomplishes this by using alkaline solutions of tungstates and carefully controlling the temperature, current density, and hydrogen ion concentration of the solution.

Prof. Fink has made many other important chemical inventions. He perfected and patented a process for chromium plating which has become a great commercial success. His process is widely used today throughout the world to plate automobile parts and other metal objects with bright chromium which does not tarnish. His patent for chromium plating has been recently sustained in the federal courts against infringers.

*Science News Letter, November 12, 1932*

PLANT PATHOLOGY

## Common Weed Destroyed To End Celery Disease

CELERY growers in Florida are now able to eliminate one of the most troublesome of the plant diseases with which they have to contend by destroying one species of weed that grows around their fields. Dr. F. L. Wellman of the U. S. Department of Agriculture tells how it was done, in *Science*.

Celery mosaic has been a major crop disease in Florida, often rendering unmarketable whole fields of the vegetable. It was known that the disease is carried by an insect, the celery aphid. After the celery harvest, this insect feeds on the weed *Commelina nudiflora,* sometimes called the day-flower, and so survives until the next crop of celery has been set out.

It seems to be unable to live on any other weed, for when all the Commelina was eliminated from around two test fields near Sanford, the loss due to mosaic was cut to between 1 and 1½ per cent., while another field, left with its girdle of Commelina, was so badly scourged with mosaic that its owner decided that the crop was not worth harvesting.

*Science News Letter, November 12, 1932*

# IN SCIEN

ASTRONOMY

## Recently Found Asteroid Given Name "Amor"

AMOR is the new companion of famous Eros, formerly most famous of the minor planets or asteroids. This name has been given to the interesting planet discovered by E. Delporte at Uccle in March of last year. It won particular notice among astronomers when it was discovered that it approached the earth closer than Eros itself, which before held the record. Shortly after the discovery of Amor's close approach to the earth, another little planet, discovered by K. Reinmuth, approached even more closely to the earth.

Amor also has the number 1221. The Berlin Rechen-Institut, which numbers the new planets discovered, has just assigned permanent designations to fifteen new planets discovered between 1927 and 1932.

Amor in mythology was identical with Eros.

*Science News Letter, November 12, 1932*

SEISMOLOGY

## Opposite Ends of Pacific Feel Submarine Quakes

OPPOSITE ends of the Pacific ocean felt the force of a pair of earthquakes that occurred about the turn of the month. The sea bottom off the coast of Alaska was shaken by a severe earthquake, on Sunday, Oct. 30, at 3:47.3 p. m., eastern standard time. Scientists of the U. S. Coast and Geodetic Survey, using data collected telegraphically by Science Service, located its epicenter at approximately 54 degrees north latitude, 156 degrees west longitude.

A submarine earthquake of moderate severity was recorded on the morning of Wednesday, Nov. 2. The epicenter was located at 24 degrees south latitude, 111 degrees west longitude. This point is in the Pacific Ocean, a little to the northwest of lonely Easter Island. Time of origin was 6:03.4 a. m., eastern standard time.

*Science News Letter, November 12, 1932.*

# FIELDS

CHEMISTRY

## Lignin Made Artificially By Heating Cellulose

LIGNIN, one of the chief constituents of wood, and as yet one of the most puzzling to chemists and industrialists, has been made artificially in the U. S. Forest Products Laboratory at Madison, Wis., by Drs. L. F. Hawley and E. E. Harris. This research followed pioneer work done previously by Dr. Hawley with Dr. Jan Wiertelak.

Lignin was made in sealed tubes, by heating cellulose, the most useful constituent of wood, at a temperature of 135 degrees Centigrade for periods up to eight days in length. The artificial lignin thus obtained gave the same reactions as the natural lignin to various chemical tests.

It is not expected that this artificial lignin will be of immediate direct commercial importance. On the contrary, natural lignin is now a nuisance and an expense to chemical manufacturers, for they do not know any use for it, and in making wood pulp have to get rid of it by various costly methods. But the discovery of Drs. Hawley and Harris will eventually be of economic value, because it leads to a better knowledge of what lignin is and will do, and this knowledge in turn is of use either in getting rid of it or even in finding a profitable occupation for it.

*Science News Letter, November 12, 1932*

GEOLOGY

## Texas May Have Had Glaciers in Coal Age

GLACIERS great enough to transport heavy boulders may have crunched their slow way across Texas landscapes millions of years ago, during the Coal age. Evidence to this effect has been found in the western part of the state, in the Trans-Pecos region, by Charles Laurence Baker, University of Texas.

The evidence consists largely of boulders of the same general type as were transported by the vast continental glaciers of the pleistocene period, millions of years later—almost yesterday, as compared with the antiquity of the Coal Age. Mr. Baker does not think his Coal Age boulders were necessarily carried by continental glaciers, however. There were mountains in West Texas then, he points out, and they could easily have been lofty enough to bear alpine glaciers of their own.

Nor would such mountain glaciers have interfered with coal formation, he believes, calling attention to the presence of coal beds in India and in the Southern Hemisphere, close to glacial deposits, while in New Zealand and Chile rich vegetation can be found within a mile of glacier fronts.

*Science News Letter, November 12, 1932*

PHYSIOLOGY

## Six Blood Types Announced by Dane

SIX TYPES of human blood can be detected and should be differentiated in blood transfusion operations, Dr. Oluf Thomsen, director of Copenhagen University's Pathological Institute has reported.

Before Dr. Thomsen's discovery, only four blood groups have been recognized practically. Whenever a blood transfusion must be performed, the surgeon must take great care to assure that the blood of the donor is of the proper type. The discovery of six types may improve the methods and success of transfusion.

As compared with the Landsteiner or International system which recognizes four groups, A, B, AB and O, Dr. Thomsen designates his groups $A_1$, $A_2$, A, $A_1B$, $A_2B$ and O. No evidence has been found in Dr. Thomsen's researches that the blood group $A_1$ and $A_2$ are not real groups of equivalent rank to those now recognized.

A family of 138 living individuals in four generations was studied by Dr. Thomsen in substantiating the theory that the new groups are true.

The groups of human blood are, detected by the way in which the red blood cells react with the blood serum of individuals whose blood type is known.

Serum of the wrong type will cause blood cells of another blood to form clumps. These agglutinations clog the minute blood vessels when the wrong blood is transfused into a patient.

A refinement of the agglutination reaction was used by Dr. Thomsen in differentiating the two new blood groups.

*Science News Letter, November 12, 1932*

ENTOMOLOGY

## Sicilian Assassin Wars Against Mexican Bandit

THE STILETTO of a Sicilian killer, first brought to this country to combat an undesirable alien presumably also from the Mediterranean region, is whetted against a Mexican outlaw as well.

All this has happened in the small but intensely-lived world of insects. At the headquarters of the Illinois State Natural History Survey, Urbana, Ill., two entomologists, Dr. Herbert Dozier and C. C. Compton, have discovered Mexican mealybugs, which are destructive parasites of greenhouse plants, to be themselves victims of the Sicilian mealybug parasite. The latter insect was brought to America to fight against another mealybug that attacks citrus trees, and has apparently been able to enlarge its field of operations. It kills by piercing the body of the mealybug and laying an egg, which hatches into a destructively feeding grub.

Mr. Compton plans to introduce the parasite into greenhouses infested with mealybugs. If the experiment succeeds, large-scale use of the Sicilian insect is probable.

*Science News Letter, November 12, 1932*

OCEANOGRAPHY

## Scripps Institution Building Named for Dr. Ritter

RITTER HALL is the name that has been given to the new laboratory building of the Scripps Institution of Oceanography at La Jolla, Calif., in honor of Dr. William Emerson Ritter, the Institution's first director. A suitable inscription, carved in raised letters on a plaque of Mexican mahogany fixed over the door, proclaims the name.

Dr. Ritter, who was associated with the late E. W. Scripps and his sister Ellen Browning Scripps in the founding of the Institution, cooperated with Mr. Scripps also in the establishment of Science Service in Washington, D. C., of the Scripps Foundation for the Study of Population Problems in Miami, Ohio, and in other philanthropic enterprises.

Dr. Ritter was the first professor of zoology at the University of California, and since his retirement as director of the Scripps Institution has returned to Berkeley, where he is continuing his zoological researches. He is honorary president of Science Service.

*Science News Letter, November 12, 1932*

PHYSICS

# Absolute Temperature

## "A Classic of Science"

### The Thermometer Scale Based on the Laws of Heat, and The "Absolute Zero" Point, at Which Motion Ceases

*ON AN ABSOLUTE THERMOMETRIC SCALE FOUNDED ON CARNOT'S THEORY OF THE MOTIVE POWER OF HEAT, AND CALCULATED FROM REGNAULT'S OBSERVATIONS. By William Thomson, Baron Kelvin. Published in Cambridge Philosophical Society Proceedings, June* 5, 1848; *and Phil. Mag., Oct.* 1848. *Republished in Mathematical and Physical Papers by Sir William Thomson, Vol. I. Cambridge: At the University Press,* 1882. *This is an exact reprint of extracts from the original publication.*

THE DETERMINATION of temperature has long been recognized as a problem of the greatest importance in physical science. It has accordingly been made a subject of most careful attention, and, especially in late years, of very elaborate and refined experimental researches; and we are thus at present in possession of as complete a practical solution of the problem as can be desired, even for the most accurate investigations. The theory of thermometry is however as yet far from being in so satisfactory a state. The principle to be followed in constructing a thermometric scale might at first sight seem to be obvious, as it might appear that a perfect thermometer would indicate equal additions of heat, as corresponding to equal elevations of temperature, estimated by the numbered divisions of its scale. It is however now recognized (from the variations in the specific heats of bodies) as an experimentally demonstrated fact that thermometry under this condition is impossible, and we are left without any principle on which to found an absolute thermometric scale.

Next in importance to the primary establishment of an absolute scale, independently of the properties of any particular kind of matter, is the fixing upon an arbitrary system of thermometry, according to which results of observations made by different experimenters, in various positions and circumstances, may be exactly compared. This object is very fully attained by means of thermometers constructed and graduated according to the clearly defined methods adopted by the best instrument-makers of the present day, when the rigorous experimental processes which have been indicated, especially by Regnault, for interpreting their indications in a comparable way, are followed. The particular kind of thermometer which is least liable to uncertain variations of any kind is that founded on the expansion of air, and this is therefore generally adopted as the standard for the comparison of thermometers of all constructions. Hence the scale which is at present employed for estimating temperature is that of the air-thermometer; and in accurate researches care is always taken to reduce to this scale the indications of the instrument actually used, whatever may be its specific construction and graduation.

The principle according to which the scale of the air thermometer is graduated, is simply that equal absolute expansions of the mass of air or gas in the instrument, under a constant pressure, shall indicate equal differences of the numbers on the scale; the length of a "degree" being determined by allowing a given number for the interval between the freezing- and the boiling-points. Now it is found by Regnault that various thermometers, constructed with air under different pressures, or with different gases, give indications which coincide so closely, that, unless when certain gases, such as sulphurous acid, which approach the physical condition of vapors at saturation, are made use of, the variations are inappreciable. This remarkable circumstance enhances very much the practical value of the air-thermometer; but still a rigorous standard can only be defined by fixing upon a certain gas at a determinate pressure, as the thermometric substance. Although we have thus a strict principle for constructing a *definite* system for the estimation of temperature, yet as reference is essentially made to a specific body as the standard thermometric substance, we cannot consider that we have arrived at an *absolute* scale, and we can only regard, in strictness, the scale actually adopted *as an arbitrary series of numbered points of reference sufficiently close for the requirement of practical thermometry.*

In the present state of physical science, therefore, a question of extreme interest arises: *Is there any principle on which an absolute thermometric scale can be founded?* It appears to me that Carnot's theory of the motive power of heat enables us to give an affirmative answer.

The relation between motive power and heat, as established by Carnot, is such that *quantities of heat,* and *intervals of temperature,* are involved as the sole elements in the expression for the amount of mechanical effect to be obtained through the agency of heat; and since we have, independently, a definite system for the measurement of quantities of heat, we are thus furnished with a measure for intervals according to which absolute differences of temperature may be estimated. To make this intelligible, a few words in explanation of Carnot's theory must be given; but for a full account of this most valuable contribution to physical science, the reader is referred to either of the works mentioned above (the original treatise by Carnot, and Clapeyron's paper on the same subject.)

In the present state of science no operation is known by which heat can be absorbed, without either elevating the temperature of matter, or becoming latent and producing some alteration in the physical condition of the body into which it is absorbed; and the conversion of heat (or *caloric*) into mechanical

This paper was written after Joule had astonished British scientists with his paper "On the Mechanical Equivalent of Heat," but William Thomson was not yet entirely converted to his friend's unorthodox views. Joule's paper will appear soon as a Classic of Science.

effect is probably impossible,[1] certainly undiscovered. In actual engines for obtaining mechanical effect through the agency of heat, we must consequently look for the source or power, not in any absorption and conversion, but merely in a transmission of heat. Now Carnot, starting from universally acknowledged physical principles, demonstrates that it is by the *letting down* of heat from a hot body to a cold body, through the medium of an engine (a steam-engine, or an air-engine for instance), that mechanical effect is to be obtained; and conversely, he proves that the same amount of heat may, by the expenditure of an equal amount of labouring force, be *raised* from the cold to the hot body (the engine being in this case *worked backwards*); just as mechanical effect may be obtained by the descent of water let down by a water-wheel, and by spending labouring force in turning the wheel backwards, or in working a pump, water may be elevated to a higher level. The amount of mechanical effect to be obtained by the transmission of a given quantity of heat, through the medium of any kind of engine in which the economy is perfect, will depend, as Carnot demonstrates, not on the specific nature of the substance employed as the medium of transmission of heat in the engine, but solely on the interval between the temperature of the two bodies between which the heat is transferred.

Carnot examines in detail the ideal construction of an air-engine and of a steam-engine, in which, besides the condition of perfect economy being satisfied, the machine is so arranged, that at the close of a complete operation the substance (air in one case and water in the other) employed is restored to precisely the same physical condition as at the commencement. He thus shews on what elements, capable of experimental determination, either with reference to air, or with reference to a liquid and its vapour, the absolute amount of mechanical effect due to the transmission of a unit of heat from a hot body to a cold body, through any given interval of the thermometric scale, may be ascertained. In M. Clapeyron's paper various experimental data, confessedly very imperfect, are brought forward, and the amounts of mechanical effect due to a unit of heat descending a degree of the air-thermometer, in various parts of the scale, are calculated from them, according to Carnot's expressions. The results so obtained indicate very decidedly, that what we may with much propriety call *the value of a degree* (estimated by the mechanical effect to be obtained from the descent of a unit of heat through it) of the air-thermometer depends on the part of the scale in which it is taken, being less for high than for low temperatures.[2]

The characteristic property of the scale which I now propose is, that all degrees have the same value; that is, that a unit of heat descending from a body $A$ at the temperature $T°$ of this scale, to a body $B$ at the temperature $(T\text{-}1)°$, would give out the same mechanical effect, whatever be the number $T$. This may justly be termed an absolute scale, since its characteristic is quite independent of the physical properties of any specific substance.

To compare this scale with that of the air-thermometer, the *values* (according to the principles of estimation stated above) of degrees of the air-thermometer must be known. Now an expression, obtained by Carnot from the consideration of his ideal steam-engine, enables us to calculate these values, when the latent heat of a given volume and the pressure of saturated vapour at any temperature are experimentally determined. The determination of these elements is the principal object of Regnault's great work, already referred to, but at present his researches are not complete.

**WILLIAM THOMSON**

***—as a young man of 28, four years after this epoch-making paper was published. It was not until 1892, when he was 68 years old, that he was made Baron Kelvin of Largs, with the title "Lord Kelvin."***

The labour of performing the necessary calculations for effecting a comparison of the proposed scale with that of the air-thermometer, between the limits 0° and 230° of the latter, has been kindly undertaken by Mr. William Steele, lately of Glasgow College, now of St. Peter's College, Cambridge. His results in tabulated forms were laid before the Society, with a diagram, in which the comparison between the two scales is represented graphically. In the first table, the amounts of mechanical effect due to the descent of a unit of heat through the successive degrees of the air-thermometer are exhibited. The unit of heat adopted is the quantity necessary to elevate the temperature of a kilogramme of water from 0° to 1° of the air-thermometer; and the unit of mechanical effect is a metre-kilogramme; that is, a kilogramme raised a metre high.



[1] This opinion seems to be nearly universally held by those who have written on the subject. A contrary opinion however has been advocated by Mr. Joule of Manchester; some very remarkable discoveries which he has made with reference to the *generation* of heat by the friction of fluids in motion, and some known experiments with magneto-electric machines, seeming to indicate an actual conversion of mechanical effect into caloric. No experiment however is adduced in which the converse operation is exhibited; but it must be confessed that as yet much is involved in mystery with reference to these fundamental questions of natural philosophy.

[2] This is what we might anticipate, when we reflect that infinite cold must correspond to a finite number of degrees of the air-thermometer below zero; since, if we push the strict principle of graduation, stated above, sufficiently far, we should arrive at a point corresponding to the volume of air being reduced to nothing, which would be marked as -273° of the scale (-100/.366, if .366 be the coefficient of expansion); and therefore -273° of the air-thermometer is a point which cannot be reached at any finite temperature, however low.

## Red Globuls in the Blood

**LEEUWENHOEK, who was born three hundred years ago, was one of the earliest possessors of a microscope. With it he discovered red globuls in the blood, which he describes in**

**THE NEXT CLASSIC OF SCIENCE**

METALLURGY

# New Steel-Making Materials Aid U. S. Defense Plans

CHEAPER substitutes for ferromanganese, necessary for removing oxygen in the final step in making steels, have been developed through several years of cooperative research at the Carnegie Institute of Technology.

In case of war the steel industry could run on a fifth to a third of its present imported ferromanganese which must now be added at the rate of about fourteen pounds to every ton of the steel produced. This important step toward America's military self-sufficiency is a by-product of the research conducted by Dr. C. H. Herty, Jr., and just reported to the Carnegie Institute's Metallurgical Advisory Board.

An alloy of iron with manganese, known as ferromanganese, is conventionally used to deoxidize the steel. The manganese is fond of oxygen, takes it away from the iron and abducts it into the slag.

Dr. Herty first made a twin combination of manganese and silicon that did the work of ferromanganese cheaper and better. For over a year these manganese-silicon alloys have been tested commercially with success in open-hearth steel making at a few large steel plants.

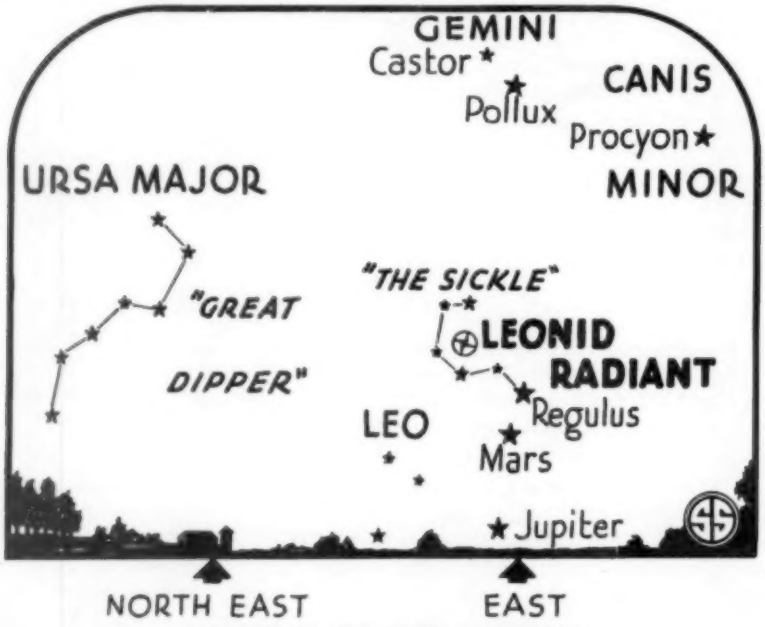
Now Dr. Herty is ready to present to the steel industry a triplet deoxidizer, an alloy of manganese, silicon and aluminum. Aluminum has an even greater avidity for oxygen than silicon or manganese. This triplet deoxidizing alloy can be made from American iron ore that runs from 5 to 35 per cent. manganese, sand that contains silicon, and bauxite which is the ore of aluminum. All of these are American products, the supply of which would not be interrupted by a war.

The new manganese-silicon-aluminum alloy will be given its first commercial test within a month, Dr. Herty announced. So far its use has been limited to test runs in the laboratory.

In making steel from pig iron oxygen is first introduced into the molten mass to remove impurities that will combine with oxygen and pass off in the slag. Then the oxygen must itself be removed and that is the function of ferromanganese and Dr. Herty's new twin and triplet deoxidizers.

The largest American supplies of manganese-carrying iron ores are in the Cuyuna range of Minnesota. If the highest manganese contents of these ores are held as war reserves and not wasted in making ordinary pig iron, Dr. Herty explained, they will be a valuable mineral resource for the future.

*Science News Letter, November 12, 1932*




WHERE METEORS WILL SHOWER

*This diagram shows the most conspicuous stars in portions of the eastern and northeastern sky as it will appear in the United States during the early morning of Wednesday, Nov. 16, when the greatest display of Leonid meteors is expected. The familiar Great Dipper will be readily located and, east of this constellation, in the cradle of the Sickle is the point from which the meteors will radiate. At this time of the morning the two bright planets, Mars and Jupiter, can be seen almost in line below the radiant. The moon, two days past full, will be high over the radiant and a short distance above Pollux. This map may be used several days before and after Nov. 16.*

ASTRONOMY

## Most Observers Expected To Watch Meteor Shower

INCREASING interest in the scientific observation of meteors, or shooting stars, by amateurs throughout the country indicates that the coming shower of Leonid meteors (*SNL, Nov.* 5, '32, *p.* 290) in the middle of this month will be more extensively watched than any previous meteor shower.

Dr. Charles P. Olivier, who as president of the American Meteor Society assembles reports from observers throughout the country, told Science Service that the Perseid meteors in August (*SNL. Aug.* 6, '32, *p.* 83) were more widely observed than any shower in recorded history. Hence astronomers expect the coming Leonids, which give promise of being much greater than the August Perseids, to be watched even more extensively.

For the Perseid shower nearly 40,000 meteors have been reported to the American Meteor Society from all sources and more reports will undoubtedly be received, Dr. Olivier said. (*SNL, Aug.* 27, '32, *p.* 131) Thirty-eight members of the Society and 327 non-members have sent in counts of their observations. Most of the non-members made counts of meteors according to instructions given by Dr. Olivier while the members actually mapped the courses of many meteors.

*Science News Letter, November 12, 1932*

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It is believed that the life span of diamond-back terrapin may be much longer than the 40 years tentatively set, since 21-year-old specimens at a government fisheries station still have young-looking shells.

# A New Christmas Surprise

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MEDICINE

# Filtrable Germs Need Not Be Extremely Small

THE GERMS causing such diseases as infantile paralysis and herpes encephalitis may be invisible with ordinary microscopes and may be able to pass through the pores of very fine filters, but they need not be extremely small, as is universally believed. This conclusion was reached by Dr. Edward C. Rosenow of the Mayo Foundation after examining filtrates of cultures of these germs with the Rife microscope.

With this microscope, designed by Dr. Royal Raymond Rife of San Diego, Calif., Dr. Rosenow found in filtrates of cultures of the streptococcus and in filtrates of the "virus" from infantile paralysis, and in filtrates of herpes encephalitis "virus" cocci and diplococci which he had not been able to detect by ordinary means.

Dr. Rosenow suggested in a report to *Science*, that the filtrable, disease-causing agent of infantile paralysis may be the familiar streptococcus in a stage in which it cannot be stained to make it visible, and is highly plastic and semi-transparent. Or it may be that these unstained, invisible forms not revealed by ordinary examination are not the viruses which cause diseases, but merely a filtrable or other state of the streptococcus. Dr. Rosenow does not incline to the latter view, however.

Incidentally, Dr. Rosenow confirmed certain findings of Dr. Arthur Isaac Kendall of Northwestern University Medical School, who in 1931 reported that he was able by using a special medium to induce a filtrable phase of the typhoid bacillus, ordinarily a fairly large germ, easily visible under the higher-powered lenses of a compound microscope. With the Rife microscope Dr. Kendall saw in his filtrate small, oval, actively-moving bodies, turquoise blue in color.

Dr. Rosenow, working in Dr. Kendall's laboratory at Chicago, was able to see these same turquoise blue bodies. The reason that they are not visible by ordinary methods of illumination and magnification is not that they are too small but are of peculiar translucent, non-staining structure, he stated.

"Their visualization under the Rife microscope is due to the ingenius methods employed rather than to excessively high magnification," is Dr. Rosenow's opinion.

*Science News Letter, November 12, 1932*

ASTRONOMY

# Height of Shooting Stars Measured With Wire Frame

HOW high and for what distance will the Leonid meteors shoot through the sky in a few days.

A definite answer to this question was given by observers of Perseid showers of meteors last August. They watched the sky through a wire frame 35 inches in diameter and located the paths of the meteors more accurately than would have been possible with the eye alone.

One party, from the University of Iowa Observatory, was stationed at Iowa City, while the other, from the Physics Department of Iowa Wesleyan College, watched the skies at Mt. Pleasant, 48 miles south of Iowa City. They observed during the same time, the Iowa City station taking data on 27 meteors and the Mt. Pleasant post noting 22. Five meteors, they agreed, were undoubtedly observed in duplicate.

By geometrical calculation the height and length of each meteor path was determined. It was found that the meteors appeared from 71 to 92 miles above the earth and disappeared at heights ranging from 55 to 65 miles. The paths varied from 12 to 44 miles in length.

The Iowa City observer was R. E. Crilley, graduate student at the University of Iowa, and the Mt. Pleasant observer was James A. Van Allen, student assistant at Iowa Wesleyan.

*Science News Letter, November 12, 1932*

ORNITHOLOGY

## NATURE RAMBLINGS by Frank Thone

**Whiskey-Jack**

IN THE HIGHER lands of the West, and scattered widely through the big timber of Canada, there ranges an interesting gray jay, closely related to the common bluejay, but known locally as the whiskey-jack. Like the bluejay, this gray jay is a great thief, and appropriately he has several aliases including meat-bird, grease-bird and camp-robber.

He is smaller than the bluejay, and not nearly so noisy. Most of the time, indeed, he is very quiet, hopping around without saying a word, or talking gently to himself about inconsequential matters. But if you think he isn't paying attention to what you are doing, just relax your own attention for a moment. In a flash, Mr. Whiskey-Jack is off with a piece of food out of your very plate, or whips away with a spoon or even with your spectacles.

Yet, thief though he is, nobody in the West or North would think of killing a whiskey-jack. There is something in his lack of shyness, in the very audacity of his picaresque raids, that tickles the fancy of rangers and lumberjacks. In the Canadian camps he is regarded as an omen of good luck, and the man who raises a hand against one would be boycotted by his fellows.

Ranger "Scotty" Baumann, of Yellowstone National Park, thanks a whiskey-jack for keeping the roof over his head during a bitter mountain winter. He noticed one of the birds raising a bigger fuss than usual over his cabin, and when he inquired into the cause he found that the shingles around his chimney were afire. Scotty is fond of all living things except coyotes anyhow; but this little adventure naturally planted the whiskey-jack more solidly than ever in his affections.

*Science News Letter, November 12, 1932*

BIOGRAPHY

# Einstein Read Philosophy When Only 13 Years Old

EINSTEIN as a high school student "ate up" physics and mathematics, and at thirteen was reading the abstruse philosophical works of Kant. These and other high-lights from the childhood of the great German scientist are given in an article in the first number of *Scripta Mathematica,* a new journal of the history of mathematics, by Dr. Max Talmey, a New York physician.

Dr. Talmey first became acquainted with the young Albert Einstein when he was a medical student at the University of Munich, and Einstein a schoolboy. Although there was a difference of eleven years in their ages, young Einstein was so mature-minded that this was quickly lost sight of, and the two became fast friends. Talmey gave Einstein the first scientific works he ever read, two popular books in physics, and followed these with a text in plane geometry. Einstein disposed of all these in short order, and soon went beyond his older friend's depth in mathematics. Then he began to show interest in philosophy, and Talmey introduced him to the works of Kant, which he tackled with relish and apparent understanding at the mature age of thirteen.

"I associated frequently with the young scientist for five years," Dr. Talmey states, "and never saw him reading any light literature or keeping company with boys of his age. He usually held himself aloof, absorbed in books on mathematics, physics and philosophy. His recreation he found in music. He had taken instruction in violin playing, but only for two years."

Dr. Talmey lost touch with the Einstein family when they moved to Milan, taking young Albert with them. Subsequently they went to Zürich, where Einstein himself became a Swiss citizen in 1900. During his early post-graduate years he had rather a hard time of it, at first teaching, then in a poorly paid post in the Swiss Patent Office. During these years Dr. Talmey saw him only once, and then again lost touch with him through his own emigration to America. The old friendship has been renewed on the occasion of Prof. Einstein's visits to this country.

*Science News Letter, November 12, 1932*

RADIO

**The Science Service radio address next week will be on the subject,**

**HEART DISEASE**

**by**

**Dr. C. S. Williamson**

**Professor and Head of the Department of Internal Medicine at the University of Illinois.**

**FRIDAY, NOV. 18**

**at 12:45 P. M., Eastern Standard Time**

***Over Stations of***

**The Columbia Broadcasting System**

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will rush ahead for several years more until the immediate possibilities of this theory have been exhausted.

The list, which follows, of some of the apparent results of Eddington's theory may not appear imposing to the layman, but the thoughtful physicist must regard it with deepest satisfaction and must feel that his highest admiration for the achievement is insufficient.

1. Eddington has properly formulated the consequences of the fact that the fundamental electric charges—the electrons—are all exactly alike and interchangeable. This is the principle underlying the whole program. From it alone all the results follow.

2. The inverse square law, with improvements, for the force between electrons is at last derived and not assumed. Thus a blemish, apparent to every beginning student of quantum physics, is removed.

3. The Exclusion Principle of Pauli is deduced from general principles and not mysteriously added to patch up flaws in an imperfect theory. This Principle, used until now entirely *ad hoc,* is one of the most significant statements ever formulated by man. Roughly it can be stated as follows: Two similar parts of a system necessarily show differences in behavior.

4. The numerical value of the electronic charge is calculated from the velocity of light and the quantum of action. Thus the number of fundamental constants is reduced—a most important achievement in which every physicist can take pride. He needs in his powerful science only four separate constants in terms of which to describe all known phenomena. This result, however, is not yet fully attained—there is a serious discrepancy outstanding, which, if the theory is sound, will bring about new triumphs.

5. The problem of two bodies has for the first time been solved in a satisfactory manner in accordance with the requirements of relativity and quantum theory. The leading workers in the field have spent much of the past four years on this problem without success.

There are other results but these may suffice to indicate why some workers are enthusiastic over the paper. If it proves correct physics will rejoice and will spread the news in all detail. If it proves false, the matter will be dropped, but the "Physical World" will hereafter be very impatient with Sir Arthur.

*Science News Letter, November 12, 1932*

PHOTOGRAPHY-ENGINEERING

## First Welded Penstock Built In California

**See Front Cover**

WELDING, an abundant source of beautiful photographs, furnishes another picture for the front cover of the SCIENCE NEWS LETTER this week; but beauty was not sufficient reason for its prominence in the cover position.

The picture was taken within a welded pipe, one-fourth mile long, tilted up a mountainside at an angle of 45 degrees. It is the penstock, or intake pipe, to Los Angeles' San Francisquito power plant number 2.

This pipe, says the Lincoln Electric Company who supplied the photograph, is the world's first arch welded penstock. It varies gradually in diameter from seven feet near the top to six feet at the bottom.

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# First Glances at New Books

**Psychology**

THE PROBLEM OF GENIUS—Wilhelm Lange-Eichbaum—Trans. by Eden and Cedar Paul—*Macmillan,* 187 p., $3. This volume contains the theoretical conclusions from the author's encyclopaedic work, "Genie, Irrsinn und Ruhm" (Genius, Insanity, and Fame) which has not yet been translated into English and also considerable additional material pertaining to relations between genius and fame, and genius and talent.

*Science News Letter, November 12, 1932*

**Physics**

ELECTRONS AND WAVES—H. Stanley Allen—*Macmillan,* 335 p., $2.50. If it is desired to obtain an introduction to atomic physics, this concise but readable book will officiate. Teachers and others who have not specialized in physics should welcome it. Mathematical symbols have not been entirely eliminated, but their use has been reduced to a minimum and only the simplest algebraic equations have been employed.

*Science News Letter, November 12, 1932*

**Communication**

MODERN MERCURIES—Lloyd George and James Gilman—*McBride,* 282 p., $3. A popular story of communication written so as to appeal to boys and girls.

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**Mineralogy-Economics**

MINERAL ECONOMICS—Edited by F. G. Tryon and E. C. Eckel—*McGraw-Hill,* 311 p., $2.50. An understanding of the technology and economics of mineral production is necessary to our present industrial life. These clarifying chapters which range from an outline of the field of mineral economics to a discussion of the future value of mineral property were delivered as lectures before the Brookings Institution.

*Science News Letter, November 12, 1932*

**Mathematics**

ELEMENTARY MATHEMATICAL ANALYSIS, Vol. I—Mayme Irwin Logsdon—*McGraw-Hill,* 210 p., $2.25. This interesting volume is the outgrowth of an experiment by Mrs. Logsdon in the teaching of mathematics at the University of Chicago. The aim was to design a single course of a half year which would give the student a rather precise idea as to the nature of the fundamental notions of elementary mathematics and their relation to his everyday life. She has used the unifying principle of functional relationship and she has introduced elementary calculus methods whenever these are available to shorten operations, to clarify principles and to lessen duplication of treatment in the text. The result would seem to be a fruitful new approach to freshman mathematics.

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**Education**

THE USE OF THE SELF—F. Matthias Alexander—*Dutton,* 143 p., $2. What is wrong with the golfer who continues to take his eye off the ball despite the "pro's" admonitions and his own good intentions? And what causes the music pupil to continue to stumble and perpetuate an error that training only seems to intensify? The author proposes a cure for such defects in control which will interest teachers even though they may not have faith in all the applications proposed.

*Science News Letter, November 12, 1932*

**Ecology**

FOODS OF SOME PREDATORY FUR-BEARING ANIMALS IN MICHIGAN—Ned Dearborn—*Univ. of Michigan Press,* 52 p., 25c. A collection of stomach analyses and other solidly factual data supporting the thesis that foxes, skunks, martens and other fur-bearers are not the pests which farmers, irritated at an occasional henroost raid, are prone to consider them. The publication constitutes No. 1 of a new bulletin series by the School of Forestry and Conservation of the University of Michigan.

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**Chemistry**

TEXTILE RESEACH—United States Institute for Textile Research, Inc.—*Massachusetts Institute of Technology Press,* 264 p., $2.50. The organization of the United States Institute for Textile Research is one of the most forward looking events in industrial research of the past few years. There have been brought together in this volume surveys of the various areas of the extensive field written by specialists. The book will interest directly anyone remotely connected with textiles and it will also serve as a model for similar surveys in other industries. The introduction by Dr. Vannevar Bush entitled "The Key to Accomplishment" is an engaging essay of fact and inspiration

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**Mineralogy**

THE STORY OF MINERALS—Herbert P. Whitlock—*American Museum of Natural History,* 144 p., 80c. This handbook to the American Museum's important mineral collection is a valuable concise reference book which should be of use to those professionally or culturally interested in the subject.

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**Psychology**

THE MIND IN CONFLICT—R. A. Howden—*Oxford,* 83 p., 85c. A brief popular account of modern methods of approach to mental problems, and modern efforts to solve them.

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**Evolution**

SURVIVAL OF THE FITTEST—Henry Smith Williams—*McBride,* 321 p., $3.50. Early Darwinism of the most naive kind, with many exceedingly bad drawings.

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**Physics**

LABORATORY PHYSICS—Dayton C. Miller—*Ginn,* 438 p., $3. A new edition of a manual that has stood the test of thirty years continuous use. Additional exercises included in the new edition relate to the photoelectric cell, the thermionic vacuum tube, the charge of the electron and other recent developments.

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**Chemistry**

THE ALBUMIN PROCESS OF PHOTOLITHOGRAPHY—Robert F. Reed and Paul W. Dorst—*Lithographic Technical Foundation,* 105 p., $2.50. A technical bulletin of value to professional workers in lithography and those interested in the physical and chemical problems of this duplication process. It is disappointing to find that the bulletin itself was not reproduced by the process that it describes.

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